Pound-Foot or Foot-Pound – Which One Is It?

Understanding Units of Torque and Work…

This document is an excerpt taken from an article by Greg Acosta which appeared on the EngineLabs website on 1/30/18.
https://www.enginelabs.com/news/torque-talk-pound-feet-foot-pounds-one/

Alert readers will note the use of "pound-feet" in some unit of measurement contexts - such as discussions of torque, and "foot-pounds" in other contexts - such as discussions of horsepower.

Are These Units Interchangeable?

The short answer is no. They are each separate, distinct units of measure. However, as it turns out, foot-pound and pound-foot can be converted between one another via complicated math, even though they measure two different things.

Here are definitions of what each unit is, and what it measures:

The "**pound-foot**" (lb-ft) is a unit of **torque** and a vector measurement that is created by one pound of force acting on a one foot lever. The formula for torque in the instance of tightening a fastener would be: Torque equals force times radius, or T = FR. When tightening a bolt, "R" would be the length of your wrench.

The "**foot-pound**" (or more accurately, "foot-pound-force"), on the other hand, is a measurement of **work**. Work is the measurement of force over a given distance. So one foot-pound-force (ft-lbf or just ft-lb) is the energy required to move a one pound object one foot of linear distance.

So while both measurements have a force component (pounds) and what is called a displacement component (feet), ft-lb is a scalar and lb-ft is a vector – which is a fancy way of saying they measure different things.

Which One Is Correct?

No one argues that the correct unit of measure when applying torque to a fastener is the pound-foot. When measuring an engine's output, however, it seems like anything goes. Since this is the subject of much debate, both online and in real life, we decided to go straight to the automotive authority on engine power measurement – the Society of Automotive Engineers – and get the straight scoop.

The industry standard for measuring an engine's power output is SAE Standard J1349, which is the standard adopted by SAE to specify a basis for net engine power and torque ratings. "SAE standard J1349, Table 1 lists the units of measure used in the standard as "N-m or lb-ft" for torque and "kW or hp" for the horsepower ratings," says Gary W. Pollak, P.E., Program Manager for the Society of Automotive Engineers.